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Open Access and Altmetrics: Distinct but Complementary

by Ross Mounce

EDITOR'S SUMMARY

Open access to publications through electronic journals has dramatically expanded downloading and use of this literature and spurred the rise of alternative metrics to assess article impact. Open access publications have been shown to gain more citations than articles with restricted access, and seven of the 10 most popular articles in 2012 were free public access with the most response, as documented through altmetrics, coming from non-scientists. Altmetrics also enables post-publication filtering and peer review in a nearly immediate timeframe for very large open access journals. Online activity measured through altmetrics highlights attention to the article on its own, less dependent on the validation of a journal name. The field of altmetrics is young, still limited to certain open websites, but with potential for considerable expansion, development and application. Open access and altmetrics can be expected to grow in a complementary and mutually supportive manner.

KEYWORDS

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Altmetrics: What, Why and Where?

Electronic publishing with dissemination via the Internet has hugely changed the landscape of academic publishing in the 21st century. Now, few journals are print-only. Many are available in print and online, while perhaps a slight majority in science, technology and medicine (STM) are published online only. This distribution is a reflection of the new reality that, for most disciplines, electronic journals have become the preferred method for discovering and accessing journal literature. Publishing content electronically, with dissemination online, is obviously less costly than publishing and disseminating print copies around the world, so there is also certainly an economic incentive for this trend, not just a social and functional preference. Alongside this growth and preference for online journals, there has been a notable rise in the growth and popularity of a particular type of online journal – open access (OA) journals, which expressly allow anyone on the Internet to read them for free without paying. Such journals make it even easier for people to discover, access and re-use journal literature.

With this change in the consumption pattern of journal content to online, new ideas such as altmetrics have arisen to help us better assess the influence and impact of online journal articles. This article considers the complementary relationship between OA journal publishing and altmetrics, scholarly impact measures derived from online activity, as a means of capturing and measuring some of the influence of online journal articles.

Open Access

Open access was first formally defined as follows by the Budapest Open Access Initiative (BOAI), as published on February 14, 2002, in a version that anyone could endorse with a signature:

“...free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited.” [1]

A brief background:

- Not all journals that label themselves as “open access” strictly adhere to or fully comply with this definition but they are all at least free to read. The *Directory of Open Access Journals (DOAJ)* lists over 8000 such publications.
- Over 300 research funders and institutions now have some form of OA mandate. Notable among these are the National Institutes of Health and the Howard Hughes Medical Institute (United States), Research Councils UK (RCUK), the Medical Research Council (UK) and the Wellcome Trust (UK), the Australian Research Council and the National Health and Research Council (Australia).
- Some estimates put the percentage of articles published as OA at greater than 16% per year [2] and significantly more if one includes self-archived manuscripts in this count.
- Many commentators, both publishers and researchers alike, have stated that it is inevitable that in the future the vast majority of research will be published as OA.

A major driver behind the OA movement is the observation that the research behind the majority of academic publications is public-sector funded (by taxpayers). The logical rationale therefore is that if the public sector funded the research, then the public sector should have the right of OA to publications arising from this research. Thus OA represents a significant improvement in access to research for scholars and non-scholars alike. With traditional subscription-access journals very few people in the world have easy access to article content, and those with this privileged, paid-for, subscription access are likely to be highly educated people affiliated with higher education institutions. By contrast OA allows access to articles by anyone on the

Internet, regardless of affiliation, education, wealth, age, gender or ethnicity. Well-controlled studies have shown that this heightened online accessibility is significantly associated with doubling the number of full-text downloads of research articles [3]. Open access articles are therefore particularly interesting to measure with altmetrics.

Complementarity Between Altmetrics and Open Access

Altmetrics help both expand and broaden our view of the impact of academic research outputs. One can track the impact of code and data with altmetrics, not just publications, but for this article I will focus just on publications. In the new reality of online availability of research more and more people are trying to access it. JSTOR, for instance, registers 150 million failed attempts every year to gain access to articles they keep behind the paywall [4]. Articles made available via such traditional pay-to-read business models may not achieve the impact they could have simply because all potential readers may have neither institutionally provided access to the resource nor the money to buy access to it themselves. Many papers have found that OA has a citation advantage relative to subscription access articles. This effect may also be true in terms of altmetrics. For example, of the 10 most popular articles in 2012 as measured with altmetrics by Altmetric.com (Table 1), 7 out of 10 were freely accessible articles [5]. Even

TABLE 1. The 10 most popular papers in 2012, as measured by Altmetric.com altmetrics

1. *The biological impacts of the Fukushima nuclear accident on the pale grass blue butterfly* (77% of tweets sent by members of the public)
2. *Association of coffee drinking with total and cause-specific mortality* (64% of tweets sent by members of the public)
3. *Rape-related pregnancy: Estimates and descriptive characteristics from a national sample of women* (82% of tweets sent by members of the public)
4. *Food for thought. What you eat depends on your sex and eating companions* (98% of tweets sent by members of the public)
5. *Bright minds and dark attitudes: Lower cognitive ability predicts greater prejudice through right-wing ideology and low inter-group contact* (79% of tweets sent by members of the public)
6. *Unilateral dermatoheliosis* (79% of tweets sent by members of the public)
7. *Higher social class predicts increased unethical behavior* (74% of tweets sent by members of the public)
8. *Science faculty's subtle gender biases favor male students* (59% of tweets sent by members of the public)
9. *Measuring the evolution of contemporary western popular music* (83% of tweets sent by members of the public)
10. *Classic Nintendo games are (NP-)hard* (78% of tweets sent by members of the public)

more remarkably, none of these 10 articles were from either of the two most widely read academic journals, *Nature* and *Science*, which both predominately publish articles behind a paywall. All of the top 10 articles clearly captured the public imagination and engagement, with the majority of activity on Twitter coming from accounts that were not identifiably scientists, science communicators or practitioners. Many of these papers may show rather unremarkable citation counts – a more traditional measure of academic impact. Their significant public impact is only revealed in a standardized way by altmetrics – services like Altmetric and ImpactStory [6] even attempt to normalize altmetrics to provide even greater context and meaning to the numbers, as well as providing open data to ensure the numbers are independently verifiable.

Altmetrics may also be of particular use for demonstrating the impact of articles published in OA megajournals. These megajournals (for example, *PLOS ONE*, *PeerJ*, *SAGE Open*, and *Scientific Reports*) do not reject articles on the basis of the perceived impact that they may have and accept article submissions as long as they are well-reported and technically sound contributions to the academic literature. Thus article-level altmetrics may be particularly key to these megajournals as a means of post-publication filtering and peer review to differentiate among the many thousands of articles that pass through them. The immediacy of altmetrics relative to more traditional measures, such as citations, also helps this filtering process. While citations take many years to accrue, tweets, facebook shares, blog posts and reference management bookmarks tend to occur much more quickly after publication. If we trace and read online conversations across the social networks about research articles, the conversations can in some cases indicate whether other researchers think the paper is particularly good or bad. Indeed, it cannot be stressed highly enough that altmetrics are about *more than just the numbers*: the greater context and content of web activity is also hugely meaningful. For many, publishing a paper in an OA journal is a truer test of their personal brand and the quality of their work than relying on the prestige and high journal impact factor of a traditional subscription-access journal. A work published in an OA journal is more clearly regarded on its own merits, not that of the journal it appears in. In this way, altmetrics

can help good OA articles shine and get the attention and respect they deserve by accurately and verifiably capturing the online activity around them.

Narcissism or Optimization of Reach and Impact?

Some have criticized altmetrics as being a “technology of narcissism” and “gameable” [7]. Yet from a personal perspective I think their depth and variety of information is highly useful for self-assessment and improvement, while the transparency is a disincentive to attempts to game it. Knowing the geographic reach of one's work, the social networks it is shared on, the people that share it, bookmark it, tweet and favor it is useful and interesting. It is not just the positive data, either. Absence of impact in certain flavors of altmetrics could indicate room for improvement and spaces in which a researcher could profit from being more visible and active. One could even envisage a situation in which an altmetric service provides near real-time alerts about one's research, which would allow the researcher, if interested, to join in and interact with the social web activity going on around the paper. I think this interaction would be a good mechanism to increase the dynamism around research publications. Even with hundreds of thousands of articles currently allowing for public comment at the end, vanishingly few create productive conversations post-publication.

A Bright and Intertwined Future for OA and Altmetrics

While OA is relatively established, altmetrics are still fairly new, relatively unexplored and underdeveloped. A great many published studies will certainly evaluate the usage of altmetrics for various purposes, stakeholders, subjects and disciplines. It is important to keep in mind that we can only use altmetrics in certain social spheres on the web that support them through their openness and standardized APIs. As more of the web opens up access to its data and links we will see both a wider variety of altmetrics and perhaps a greater richness and depth to these measures in future. The standardization and openness fits well with the OA publishing model and less well with subscription-access publishing. Research evaluation has for a long time utterly depended upon commercially provided citation databases such as Elsevier's *Scopus* or Thomson Reuters'

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Web of Knowledge, but a host of new organizations, both for-profit and not-for-profit, have recently sprung up to market altmetrics-based information services. This development can only be a good thing to increase competition and diversity. Not all web activity around articles can be captured by

altmetrics – there will always be “dark social” [8] sharing and paywall-protected research, but this model of transparency for both publishing and assessing research will undoubtedly have an interesting and intertwined future ahead of it. ■

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